Nothing that has occurred in the past six months has changed our view on this subject. The cable and consumer electronics industries remain open to possible future developments. However, some of the characteristics at issue are fundamental and do not appear to be subject to technical solution.

Digital Standards. Last, but definitely not least, is the subject of digital technology. The Notice states, "[i]n order to avoid future compatibility problems that could arise with the introduction of digital transmission methods by the cable industry, we also believe that it will be necessary to standardize the system used for digital transmission."[62] The Advisory Group agrees.

The mutual recognition of the need for digital standards was a central element of the agreement that made it possible to submit joint recommendations to the Commission, and it is indispensable to the current cooperative efforts of the two industries. More importantly still, a firm understanding that digital standards will be prescribed is essential to provide assurance to consumers and legislators against a recurrence of the kinds of problems that led to adoption of Section 17.

This is an area where the Commission has an important role to play. The two industries are endeavoring to identify and develop consensus technical recommendations for digital transmission and, later, compression and a standard security interface system which can be incorporated into the Commission's rules. This will be a challenging but vital task that requires careful balancing of interests. On the one hand, it is critical that uniformity be achieved to assure necessary compatibility. On the other hand, it is equally important that consumers be protected from the adverse consequences of premature standardization (which could hinder the development of new

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62/ Notice at ¶ 34.

services or new features in consumer electronics products or other technological advances).[63]

The digital cable television environment is developing quickly, and the Advisory Group anticipates that much will be achieved within the coming months. As indicated in the Notice,[64] the Advisory Group has established a timetable for defining digital transmission and tuner specifications by year-end 1994. Already the Joint Engineering Committee's Digital Subcommittee has begun the important task of investigating on-going digital standards activities both domestically and internationally.[65] A report of their findings will lay important groundwork for the Advisory Group; the report from the JEC is expected by mid-1994.[66] We would anticipate that this in turn could serve as the basis for a Supplemental Notice of Proposed Rulemaking.

As noted above, the Advisory Group is anxious to move ahead with joint recommendations on digital standards as quickly as possible. The timetable included in

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63/ The Commission's on-going effort to adopt standards for terrestrial broadcast of advanced television (MM Docket No. 87-268) exemplify the importance of balancing a need for standard-setting with the time needed for technological innovation. In that proceeding, the Commission's initial insistence on a tight timetable helped to spur rapid development of ATV technologies, but its subsequent flexibility has allowed for the emergence of digital ATV.

64/ Notice at 17 n.30.

65/ As previously noted, the Advisory Group is especially interested in the work underway by the Moving Pictures Experts Group and the Grand Alliance on Advanced Television. It is hoped that hierarchical relationships between broadcast and cable standards will prove to be feasible. The work of the Grand Alliance on signal security conditional access may yield useful insights regarding cable security measures.

66/ More specifically, the digital working group is expected to be organized no later than April 1994. A "requirements list" for digital standards is expected to be generated by the end of June 1994. Some form of "request for information" is likely to be issued in September, with responses due in October, and evaluation of responses in November.

the joint recommendations[67] is both reasonable and realistic; it balances the need for early identification of proposed standards to allow for the incorporation of various functions into competitively supplied consumer electronics products with the importance of preserving necessary flexibility to permit technological innovation and the development of new services and consumer electronics product features. Once the Advisory Group's recommendations are formulated, the Commission can quickly proceed to adopt technical standards to assure continuing compatibility.

67/

1993:	Define "cable-ready
1994:	Define transmission and tuner specifications
No later than 1995:	Set target dates for standards for decompression and a standard security interface system

IV. CONCLUSION

The Advisory Group has labored long and hard to assist the Commission in implementing Section 17 of the Cable Act. Efforts to date have been fruitful, and progress is expected to continue. The Advisory Group pledges its continuing cooperation with the Commission in the months remaining before initial regulations to implement Section 17 are required to be adopted.

Respectfully submitted,

CABLE-CONSUMER ELECTRONICS
COMPATIBILITY ADVISORY GROUP

by: Walter S. Ciciora, Co-Chairman

by: James E. Bonan, Co-Chairman

January 25, 1994

LIST OF APPENDICES

AMERICAN NATIONAL STANDARD

APPENDIX A

EIA STANDARD

Cable Television Channel Identification Plan

DRAFT EIA-542 (when released)

FEBRUARY 1994

ELECTRONIC INDUSTRIES ASSOCIATION

ENGINEERING DEPARTMENT

EIA DRAFT STANDARD

CABLE TELEVISION CHANNEL IDENTIFICATION PLAN

1.0 Introduction

This standard supersedes IS-6, specifically designating 6 MHz channel number allocations for 158 channels up to 1002 MHz, with a method of specifying higher channels. The standard does not specify a channel number plan for digital, time-multiplexed subchannels, because channel designators are not applicable in packetized transmission formats which use headers to define program information. Access to the digital channels will be achieved in some other way, such as through a program menu. While this standard makes it possible to determine a receiver tuning range capacity, the standard itself does not, nor is it intended to, define or standardize a tuning capacity. Tuning capacity should be defined in some other context.

2.0 Channel Identification Plan

2.1 Definitions of Terms - General

Note: Within the scope of this plan, the following definitions shall apply.

2.1.1 Standard Frequencies

This is a cable transmission system that transmits on the standard off-air frequencies for the channels 2-6 and 7-13. Supplemental channels are in 6 MHz increments down from channel 7 (175.25 MHz) to 91.25 MHz (channels 14-22 and 95-99) and upwards from channel 13 (211.25 MHz).

2.1.2 Harmonic Related Carriers

This is a cable transmission system that transmits on picture carrier frequencies that are multiples of 6.0003 MHz and starts at 54 MHz. It involves frequency displacements of -1.25 MHz on all standard and supplementary channels except channels 5 and 6, where the displacement is +0.75 MHz.

2.1.3 Incremental Related Carriers

This is a cable transmission system that transmits on picture carrier frequencies starting at 55.25 MHz and increments each channel by 6 MHz, except as noted.

2.2 FM Band Usage

Compliance with this plan does not include channels 95-97. Therefore, utilization of these channels by a cable system is on a voluntary basis, and recommended signal carriage is for services other than those involving transmission of a picture (standard or scrambled) to a consumer.

Many television receivers currently on the market and compatible units to be produced in the near future contain traps to attenuate the FM band, thereby greatly reducing a source of crossmodulation and intermodulation interference to TV. Inclusion of these traps inhibits the reception of these channels.

2.3 Channel Edge Definition

For any channels delivered to the consumer, the lower band edge shall be 1.25 MHz below picture carrier shown in the table, and the upper edge shall be 4.75 MHz above the picture carrier.

2.4 Formula for channels above channel 158

Above channel 158, each 6 MHz bandwidth shall be numbered consecutively, beginning with channel 159.

2.5 Frequency Tolerances

Frequency offsets in the aeronautical bands shall be as mandated by the FCC (see Section 76.612 of the Commission's Rules).

Table 1
CHANNEL IDENTIFICATION PLAN
BY CHANNEL DESIGNATION

Channel Designation	Picture Carrier Frequency (MHz)		
	STD	HRC	IRC
1	undesignated	72.0036	73.2625
2	55.2500	54.0027	55.2625
3	61.2500	60.0030	61.2625
4	67.2500	66.0033	67.2625
5	77.2500	78.0039	79.2625
6	83.2500	84.0042	85.2625
7	175.2500	174.0087	175.2625
8	181.2500	180.0090	181.2625
9	187.2500	186.0093	187.2625
10	193.2500	192.0096	193.2625
11	199.2500	198.0099	199.2625
12	205.2500	204.0102	205.2625
13	211.2500	210.0105	211.2625
14	121.2625	120.0060	121.2625
15	127.2625	126.0063	127.2625
16	133.2625	132.0066	133.2625
17	139.2500	138.0069	139.2625
18	145.2500	144.0072	145.2625
19	151.2500	150.0075	151.2625
20	157.2500	156.0078	157.2625
21	163.2500	162.0081	163.2625
22	169.2500	168.0084	169.2625
23	217.2500	216.0108	217.2625
24	223.2500	222.0111	223.2625
25	229.2625	228.0114	229.2625

Table 1 (Con'd)
CHANNEL IDENTIFICATION PLAN
BY CHANNEL DESIGNATION

Channel Designation	Picture Carrier Frequency (MHz) STD	HRC	IRC
26	235.2625	234.0117	235.2625
27	241.2625	240.0120	241.2625
28	247.2625	246.0123	247.2625
29	253.2625	252.0126	253.2625
30	259.2625	258.0129	259.2625
31	265.2625	264.0132	265.2625
32	271.2625	270.0135	271.2625
33	277.2625	276.0138	277.2625
34	283.2625	282.0141	283.2625
35	289.2625	288.0144	289.2625
36	295.2625	294.0147	295.2625
37	301.2625	300.0150	301.2625
38	307.2625	306.0153	307.2625
39	313.2625	312.0156	313.2625
40	319.2625	318.0159	319.2625
41	325.2625	324.0162	325.2625
42	331.2750	330.0165	331.2750*
43	337.2625	336.0168	337.2625
44	343.2625	342.0171	343.2625
45	349.2625	348.0174	349.2625
46	355.2625	354.0177	355.2625
47	361.2625	360.0180	361.2625
48	367.2625	366.0183	367.2625
49	373.2625	372.0186	373.2625
50	379.2625	378.0189	379.2625

Table 1 (Con'd)
CHANNEL IDENTIFICATION PLAN
BY CHANNEL DESIGNATION

Channel Designation	Picture Carrier Frequency (MHz)		
	STD	HRC	IRC
51	385.2625	384.0192	385.2625
52	391.2625	390.0195	391.2625
53	397.2625	396.0198	397.2625
54	403.2500	402.0201	403.2625
55	409.2500	408.0204	409.2625
56	415.2500	414.0207	415.2625
57	421.2500	420.0210	421.2625
58	427.2500	426.0213	427.2625
59	433.2500	432.0216	433.2625
60	439.2500	438.0219	439.2625
61	445.2500	444.0222	445.2625
62	451.2500	450.0225	451.2625
63	457.2500	456.0228	457.2625
64	463.2500	462.0231	463.2625
65	469.2500	468.0234	469.2625
66	475.2500	474.0237	475.2625
67	481.2500	480.0240	481.2625
68	487.2500	486.0243	487.2625
69	493.2500	492.0246	493.2625
70	499.2500	498.0249	499.2625
71	505.2500	504.0252	505.2625
72	511.2500	510.0255	511.2625
73	517.2500	516.0258	517.2625
74	523.2500	522.0261	523.2625
75	529.2500	528.0264	529.2625

Table 1 (Con'd)
CHANNEL IDENTIFICATION PLAN
BY CHANNEL DESIGNATION

Channel Designation	Picture Carrier Frequency (MHz) STD	HRC	IRC
76	535.2500	534.0267	535.2625
77	541.2500	540.0270	541.2625
78	547.2500	546.0273	547.2625
79	553.2500	552.0276	553.2625
80	559.2500	558.0279	559.2625
81	565.2500	564.0282	565.2625
82	571.2500	570.0285	571.2625
83	577.2500	576.0288	577.2625
84	583.2500	582.0291	583.2625
85	589.2500	588.0294	589.2625
86	595.2500	594.0297	595.2625
87	601.2500	600.0300	601.2625
88 **	607.2500	606.0303	607.2625
89 **	613.2500	612.0306	613.2625
90	619.2500	618.0309	619.2625
91	625.2500	624.0312	625.2625
92	631.2500	630.0315	631.2625
93	637.2500	636.0318	637.2625
94	643.2500	642.0321	643.2625
95	91.2500	90.0045	91.2625
96	97.2500	96.0048	97.2625
97	103.2500	102.0051	103.2625
98	109.2750	108.0250 *	109.2750 *
99	115.2750	114.0250 *	115.2750 *
100	649.2500	648.0324	649.2625

Table 1 (Con'd)
CHANNEL IDENTIFICATION PLAN
BY CHANNEL DESIGNATION

Channel Designation	Picture Carrier Frequency (MHz)		
	STD	HRC	IRC
101	655.2500	654.0327	655.2625
102	661.2500	654.0327	661.2625
103	667.2500	660.0330	667.2625
104	673.2500	666.0333	673.2625
105	679.2500	672.0336	679.2625
106	685.2500	684.0339	685.2625
107	691.2500	690.0345	691.2625
108	697.2500	696.0348	697.2625
109	703.2500	702.0351	703.2625
110	709.2500	708.0354	709.2625
111	715.2500	714.0357	715.2625
112	721.2500	720.0360	721.2625
113	727.2500	726.0363	727.2625
114	733.2500	732.0366	733.2625
115	739.2500	738.0369	739.2625
116	745.2500	744.0372	745.2625
117	751.2500	750.0375	751.2625
118	757.2500	756.0378	757.2625
119	763.2500	762.0381	763.2625
120	769.2500	768.0384	769.2625
121	775.2500	774.0387	775.2625
122	781.2500	780.0390	781.2625
123	787.2500	786.0393	787.2625
124	793.2500	792.0396	793.2625
125	799.2500	798.0399	799.2625

Table 1 (Con'd)
CHANNEL IDENTIFICATION PLAN
BY CHANNEL DESIGNATION

Channel Designation	Picture Carrier Frequency (MHz) STD	HRC	IRC
126	805.2500	804.0402	805.2625
127	811.2500	810.0405	811.2625
128	817.2500	816.0408	817.2625
129	823.2500	822.0411	823.2625
130	829.2500	828.0414	829.2625
131	835.2500	834.0417	835.2625
132	841.2500	840.0420	841.2625
133	847.2500	846.0423	847.2625
134	853.2500	852.0426	853.2625
135	859.2500	858.0429	859.2625
136	865.2500	864.0432	865.2625
137	871.2500	870.0435	871.2625
138	877.2500	876.0438	877.2625
139	883.2500	882.0441	883.2625
140	889.2500	888.0444	889.2625
141	895.2500	894.0447	895.2625
142	901.2500	900.0450	901.2625
143	907.2500	906.0453	907.2625
144	913.2500	912.0456	913.2625
145 @	919.2500	918.0459	919.2625
146	925.2500	924.0462	925.2625
147	931.2500	930.0465	931.2625
148	937.2500	936.0468	937.2625
149	943.2500	942.0471	943.2625
150	949.2500	948.0474	949.2625

Table 1 (Con'd)
CHANNEL IDENTIFICATION PLAN
BY CHANNEL DESIGNATION

Channel Designation	Picture Carrier Frequency (MHz) STD	HRC	IRC
151 @@	955.2500	954.0477	955.2625
152 @@	961.2500	960.0480	961.2625
153 @@	967.2500	966.0483	967.2625
154	973.2500	972.0486	973.2625
155	979.2500	978.0489	979.2625
156	985.2500	984.0492	985.2625
157	991.2500	990.0495	991.2625
158	997.2500	996.0498	997.2625

* Excluded from comb due to FCC offset

** These channels occupy frequencies used by many set top converters as their IF frequency. Before using them on a system, the operator must ensure that interference does not occur.

In addition, many converters use local oscillator frequencies above about 670 MHz. Before using an extended frequency plan, a cable operator should test all converters on the system to determine the extent, if any, of interference.

@ Use of this channel for priority programming is not recommended. It is used as the second local oscillator frequency for some television sets. The possibility exists that local oscillator leakage from the set may cause interference to another TV viewing this channel. The interference may be independent of the channel to which the subject TV (i.e., the one containing the double conversion tuner) is tuned.

@@ Use of these channels for any programming is not encouraged. They are used as the first intermediate frequency in some television sets. When such a set is tuned to any channel in this part of the spectrum, it may experience interference from carriers on these channels. If this occurs, the only solution may be to provide a bandstop filter tuned to these channels. Such a filter will, of necessity, remove several additional channels either side of channels 151-153.

Decoder Interface Subcommittee
INTERIM REPORT
January 20, 1994

To the Joint Engineering Committee of the EIA & NCTA

Introduction:
This report will summarize the current progress of the Decoder Interface Subcommittee on our work of developing a new standard for the interface between televisions and VCRs and a modular cable decoder/descrambler. This report and our work thus far, represent a complete agreement between the representatives of both industries.

Advantages over EIA/ANSI 563
This new decoder interface standard will have several important advantages over the previous standard for peripheral interfaces known as EIA-563. Because the architecture was specifically chosen for this purpose, the new decoder interface standard will provide complete compatibility with all of today's existing analog scrambling systems, while the 563 interface will not. The new decoder interface standard has also been designed to be extensible to future digital services. The 563 interface does not provide this capability. The new decoder interface standard has also been designed to allow convenient and simultaneous implementation of advanced cable services as well as advanced TV and VCR features. The new decoder interface has been developed with the full support of both the consumer electronics industry and the cable television industry.

Interface Overview
The Decoder Interface Subcommittee intends to be prepared to release a new Interim Standard (IS-105) by July of 1994, with the full ANSI standard ballot in the spring of 1995. While all aspects of the new decoder interface standard have not yet been fully defined, the subcommittee has prepared this summary of the basic elements:

1. Connector Requirements
    A. A single multipin connector that contains at least 20 pins e.g. JAE #TX-10, to be confirmed.
    B. A single female type-F connector conforming to SCTE specification # IPS-SP-400.
2. Signal Requirements, TV or VCR
    A. Unfiltered intermediate frequency (IF) output with multiplexed RF AGC control input signal.

B. Video input on 3 balanced pairs (six wires)
   (1) Minimum configuration of composite only.
   (2) Support for separate Y/C signals is optional.
C. Audio input on 4 balanced pairs (eight wires)
   (1) Minimum configuration of one input (mono)
   (2) Stereo and SAP input are optional.
D. Bi-directional control signals.
E. Pins reserved for future use.

3. Signal Requirements, Modular Decoder/Descrambler.
   A. Unfiltered intermediate frequency (IF) input with multiplexed RF AGC output.
   B. Video output on 3 balanced pairs (six wires)
      (1) Minimum configuration of composite only.
      (2) Support for separate Y/C signals is optional.
   C. Audio output on 4 balanced pairs (eight wires)
      (1) Audio processing is optional.
      (2) When audio processing is included, minimum configuration includes support for mono, left, right and SAP
   D. Bi-directional control signals.
   E. Pins reserved for future use.

Work Remaining:

A. Define bi-directional control protocol.
B. Finalize AGC & AFT interface characterization.
C. Finalize connector requirements, including ground.
D. Finalize signal level and characteristics.
E. Clarification of the conditions for optional requirements.
F. Extend the specification to allow migration of digital processing into the consumer electronic products when standards are available for digital signal delivery on cable.

Timetable and Milestones:

The Decoder Interface Subcommittee suggests the following timeline to complete the necessary work:

Feb. 28, 1994	DIS	Submittal to FCC of remaining Decoder Interface technical parameters, including digital*
Jul. 1994	JEC	Release Decoder Interface Interim Standard.
Sep. 1994	industry	Establish compatibility testing laboratory
Spring 1995	JEC	Issue EIA/ANSI Decoder Interface Standard.
Dec 31, 1996		Modular decoders become available.
June 30, 1997		Cable Ready receivers' requirements effective.
Future**	DIS	Define functionality to allow migration of some digital processing into consumer electronics products

* The digital parameters are pending the conclusions of the Grand Alliance.

** Pending standardization of digital transmission systems on cable.

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David K. Broberg, Co-chairman

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Walter S. Ciciora, Co-chairman

January 13, 1994

TO: Chairmen, EIA/NCTA Joint Engineering Committee
Reviewers of the Draft Interface Specification

FROM: Joint Engineering Committee, Working Group II Members

SUBJECT: SUGGESTED PERFORMANCE CRITERIA FOR CABLE-READY RECEIVERS

1.0 INTRODUCTION

1.1 Many of the performance requirements for cable television systems are specified in Part 76 of the FCC's rules. Similarly, many of the performance requirements for television receiving devices are specified in Part 15. These existing rules, however, are not sufficient to assure full compatibility when receiving devices are directly connected to cable system outlets.

1.2 Under the Cable Act of 1992 (the "Act"), the FCC has been mandated to specify the characteristics of receiving devices marketed as "cable ready" (or similar terms) which will assure compatibility. Acting in response to the FCC's call for industry input, the Cable-Consumer Electronics Compatibility Advisory Group ("C^3AG") has requested that the Joint Engineering Committee (JEC) develop technical specifications covering channelization, tuner performance requirements and a decoder interface connector. Working Group II ("WGII") was requested to develop the tuner performance specification. This document is issued in response to the specific tuner performance criteria suggested in the NPRM on consumer criteria.

1.3 In addition, WGII is developing a voluntary standard (identified as EIA IS-23) entitled *RF Interface Specification for Television Receiving Devices and Cable Television Systems*. This document covers additional issues for receivers as well as requirements to be applied to cable operators. While this document is not complete, agreement has been reached on many parameters of the interface.

2.0 GENERAL COMMENTS

2.1 ***Approach***. While it is possible to develop specifications which will assure interference-free reception in every case, including combinations of worst-case situations, it would result in cable systems and receivers whose performance is far in excess of that required for most conditions and excessive costs which will ultimately have to be borne by consumers. WGII determined that it was more cost effective to achieve performance levels that would assure compatibility in the vast majority of cases and to leave it to manufacturers and operators to deal with the few individual

cases in which unusual combinations of performance and operating conditions cause reception problems.

2.2 In keeping with that philosophy, WGII recognizes that the performance of manufactured receivers will vary. In order to avoid the degree of over- specification that would be required to assure 100% compliance with every specification, we feel that a 95% compliance level with each specification is more cost effective and strongly suggest that the FCC adopt this standard with respect to the performance criteria under consideration. We wish to emphasize that this is not an attempt to modify compliance levels with existing Part 15 or Part 76 rules, but rather that this compliance standard will apply only to the suggested new performance criteria suggested in the NPRM.

2.3 ***Remaining Efforts to Complete***. In response to the NPRM, this document suggests performance levels for most of the parameters listed. The work remaining to completely specify the interface includes:

- Complete Test Procedures. WGII has several proposed test procedures under review. It will be some time before these can be thoroughly evaluated and incorporated into the document.

- Tuner Characteristics Required for Digitally Compressed Signals. The proposed Decoder Interface Connector includes an unfiltered IF output port. This output is required for full compatibility with all existing analog scrambling systems and also offers the possibility of introducing digitally-compressed programming without immediately re-creating the necessity of using a set-top descrambler. Unfortunately, digital transmission formats are still being developed and thus it is not yet possible to specify with certainty the unique tuner performance characteristics required to pass the digital signal to the IF output with adequate fidelity to assure reasonably error-free reception by a set-back decoder. A working party of the Decoder Interface Working Group is actively gathering data from digital transmission proponents in order to guide us in this area and we hope to be able to provide guidance to receiver manufacturers in time for incorporation in cable-ready receivers.

3.0 RESPONSE TO SPECIFIC NPRM TUNER PERFORMANCE SPECIFICATIONS

3.1 The following comments are referenced to paragraph numbers in the NPRM. Where reference is made in the following response to visual signal level, that level is understood to be defined as it is in the Part 76 rules, *i.e.* the rms value of the visual carrier measured during the synchronizing pulse.

3.2 ***Paragraph 22: Adjacent Channel Rejection***. The NPRM suggests requiring receivers to not exceed the "just perceptible" interference level when the input consists of a desired signal and adjacent signals whose levels exceed the desired channel by 3 dB. This

channel level difference is consistent with Part 76 requirements on cable operators. WGII agrees with this suggested standard.

3.3 Suggested performance standard: When the input to a receiver consists of an NTSC channel whose visual signal level is between 0 and +20 dBmV, plus an additional unmodulated carrier whose frequency is 1.5 MHz ± 50 kHz lower in frequency than the visual carrier of the NTSC channel and whose level is 10 dB below the visual signal level of the NTSC channel, the level of the spurious response 1.5 MHz above the visual carrier, as measured at the unfiltered IF output port, shall be at least 55 dB below the level of the NTSC channel visual signal.

3.4 Discussion: Adjacent channel performance is the combined response to lower and upper adjacent visual, chroma and aural signals. In accordance with Part 76, the aural signal levels of those adjacent channels may vary in level from -10 dB to -17 dB with respect their visual signals, though in practice, few operators use levels in excess of -13 dB. Industry experience suggests that lower adjacent aural signal interference dominates the other potential sources and therefore WGII has limited the test to that single parameter. Although it is possible that the visual signal of a lower adjacent channel could be as much as 3 dB higher (the maximum Part 76 allowable adjacent channel level difference) and simultaneously have its aural carrier set as high as -10 dB with respect to its visual signal, WGII feels that a lower adjacent aural level of -10 dB will seldom be exceeded in actual installations.

3.5 The visual appearance of lower adjacent aural interference is in the form of a 1.5 MHz beat pattern in the desired channel picture. As such, its appearance is similar to other discrete interfering carriers and a 55 dB suppression ratio is appropriate.

3.6 ***Paragraph 22: Tuner Distortion Products***. The NPRM suggests that tuners not generate distortion products exceeding 55 dB below visual carrier levels.

3.7 Suggested Performance Standard. When the input to a receiver consists of a comb of unmodulated carriers whose frequencies correspond to all of the possible video carriers between 54 and 750 MHz, in the Standard (as opposed to HRC or IRC) frequency plans delineated in EIA 542, and whose individual amplitudes are +15 dBmV, the magnitude of all spurious products falling within the 6 MHz wide unfiltered IF shall be at least 51 dB below the amplitude of any tuned carrier.

3.8 Discussion. Tuner overload performance is a measure of the magnitude of intermodulation products which lie within the tuned channel. When receivers are connected to cable systems, they are exposed to the entire spectrum of signals carried, as opposed to the off-air situation where many fewer signals are present (though generally of more widely varying amplitudes). WGII suggests standardizing on a test signal condition which corresponds to the maximum amplitude comb of cable signals likely to impinge upon receiver tuners connected to a cable drop cable (but using CW

carriers in place of modulated television signals for all but the channel under test) and extending from 54 to 750 MHz.

3.9 Part 76 of the Commission's rules do not specify a maximum cable-delivered visual signal level at the input of subscriber's equipment. Draft EIA Standard IS-23 contains limits on the maximum amplitude of individual visual signals (+20 dBmV), on the average visual signal level (+15 dBmV), and the peak and average amplitudes of non-video signals which may be present at the receiver input terminals. WGII's suggested test signal condition for receivers is consistent with this standard.

3.10 We feel that limiting the spectrum to 750 MHz, rather than 1,002 MHz is justified because:

- It is more probable that digital, rather than analog signals will be used at these higher frequencies and that a) they are likely to be lower in level by at least 5-10 dB and b) due to their broader spectral spread, their effect visual effect is more like a slight increase in noise than a discrete beat.

- If analog signals are used, it is more likely that higher frequencies will be attenuated relative to lower frequencies due to the differential loss in the drop cable.

3.11 Under these conditions we recommend that the limit for all products falling within the 6 MHz IF passband be set to -51 dB with respect to the level of the desired visual signal during synchronizing pulses. Although this is higher than the -55 dB standard suggested in the NPRM, it should be understood that, in normal operation, the IM products will meet the NPRM-suggested performance standard because normal NTSC television signals have about 6 dB lower average power levels than the CW test carriers. The use of CW carriers for IM testing is universally used in transmission equipment because it gives repeatable results.

3.12 ***Paragraph 23: DPU.*** The NPRM suggests that a receiver exposed to a 100 mV/m external RF field not exceed the standard of "just perceptible" ingress interference to the received signal.

3.13 Suggested Performance Standard: The average of the subscriber device's response to exposure to an external ambient radio frequency field whose frequency varies between 54 and 800 MHz and whose amplitude is 100 mV/m, when tuned to each of six EIA 542 television channels (two each in the low VHF, high VHF and UHF broadcast bands) whose individual RF levels are 0 dBmV, shall be 50 dB below the response to

the desired signal (90 dB REL[1]). Additionally, the response at any individual channel shall not exceed 45 dB below the response to the desired signal. At frequencies between 800 MHz and 1,002 MHz, the average response when tuned to six EIA 542 channels approximately equally spaced in the band shall be 40 dB below the response to the desired signal (80 dB REL) and at no individual channel shall the response exceed 35 dB below the response to the desired signal. Response shall be measured by the relative level of the desired signal visual signal (measured during the synchronizing pulse) and the rms amplitude of the interfering carrier as measured within the 6 MHz nominal bandwidth of the channel at the unfiltered IF output port. If the device is furnished with interconnecting cables, then the measurement shall be made with the interconnecting cables attached in a normal configuration. The measurement method shall be equivalent to that developed by Carl T. Jones and entitled *Susceptibility Test Methodology and Test Procedures for Television Receivers and Video Cassette Receivers*, with such modifications as mutually agreed upon by the consumer electronics and cable television industries.

3.14 Discussion. A study done by Stern, under CableLabs sponsorship, predicts that 40.8% of television households will experience field strengths of 100 mV/m or greater on at least one television broadcast channel. A similar study done on behalf of the EIA by Jules Cohen predicts that 46.2% of households will experience 100 mV/m. Above that field strength, the studies diverge, with Stern predicting that 6% will experience field strengths of 1 volt/m, while Cohen predicts 8.4% will experience 300 mV/m, but less than 1% will experience 1V/m. Both studies predict that the probability of UHF interference exceeds that of VHF interference at the highest field strengths which is unfortunate from the standpoint of visual impairment as UHF stations are offset from cable channels in the same frequency ranges resulting in beat patterns which are subjectively more apparent than frequency coherent interference. Neither study included interference from non-television-broadcast sources such as paging transmitters. Both studies are included with this document.

3.15 There are, however, mitigating factors. For one thing, the C.T.Jones test procedure currently under review measures susceptibility at all receiver orientations relative to the external field. Testing of 35 representative television receivers (plus a number of VCRs and converters) done by Jones suggests that susceptibility is strongly dependent on this orientation. Given that actual receivers may be oriented randomly with

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[1]Receiver Effective Length (REL) is a commonly used measurement of shielding efficiency which can be mathematically expressed as:

$$REL = D/U(dB) + FS(dBmV/m) - RCV(dBmV)$$

Where: D/U = ratio of desired visual signal level to interfering carrier in dB
FS = external field strength in dB relative to 1 mV/m
RCV = the level of the desired signal in dBmV

respect to external fields, the average susceptibility in homes will certainly be less than the tested maximum. Secondly, neither study attempted to predict the average effects of buildings and other structures on the signal strength received by receivers inside dwellings relative to that measured in relatively "free space" outside. While in some cases, the field strengths may actually be higher due to reflected signals constructively combining or due to receivers being located far above ground level (as in a high-rise apartment situation), on average it can be expected that there will be some attenuation affects.

3.16 Finally, the existing Canadian standard is 80 dB REL over a more limited frequency range, so that the proposed standard represents a material improvement over current practice.

3.17 Given the mitigating factors, WGII believes that its proposed standard is consistent with the Commission's proposed performance criteria. We further submit that the test procedure used has the advantage that it does not rely on subjective observation of picture impairment

3.18 ***Paragraph 23: Emissions Conducted Into Cable Systems From Receivers***. The Commission has suggested limiting the amplitude of all signals transmitted by receivers back into cable systems to -37 dBmV.

3.19 Emissions into cable systems from television receiving devices can originate from one of three sources:

A. Local oscillator and other internally generated signals in the television receiver.

B. DPU signals.

C. Signals from consumer's off-air antennas coupled through the limited isolation between the input terminals of input selector switches (covered under Paragraph 24, below).

3.20 ***A. Local Oscillator and Other Signals Appearing at Input Terminals***.

3.21 Suggested Performance Standard: The level of any local oscillator and of any other signal of an undesired or spurious nature generated within a subscriber's device to be connected to the cable and arriving at the cable input terminal of the device shall not exceed the values in the following table: